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[WITH COMPLIMENTS OF THE AUTHOR.]

THE LIBERATING OF THE RING FINGER, IN MUSICIANS,  
BY DIVIDING THE ACCESSORY TENDONS OF THE  
EXTENSOR COMMUNIS DIGITORUM MUSCLE.

BY

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Vice-President Philadelphia County Medical Society;  
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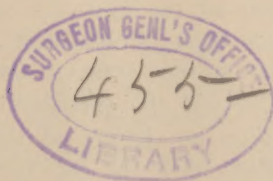
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[Reprinted from the Proceedings of the Philadelphia County Medical Society.]

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Read November 12, 1884.

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WHEN the middle finger and the ring finger are brought down by the flexor muscles, and their balls are held down firmly against the keys of a musical instrument, as in performing on a piano, for the purpose of producing continuous sounds, and at the same time it should be necessary to extend and then to flex the ring finger in order to produce accompanying sounds, it will be found that in the still flexed position of the middle and little fingers, the ring finger can be but very slightly extended. Its complete extension, without operative interference, can only be brought about by long-continued exertion in practice, when elongation of certain accessory, but restricting, tendons is made by nutritive change.

To explain the cause of the inability to extend at once, completely, this ring finger, and to demonstrate the way to remove this cause, by a surgical operation of simple moment, is the object of this paper.

In the dorsal aspect of the metacarpal zone in man, dissection shows that the tendon of the extensor communis digitorum muscle that goes to the ring finger gives off a slip on either side, one of which goes to join the extensor tendon of the middle finger and the other to join the extensor tendon of the little finger. These two slips are known as the lateral vincula or *accessory* tendons. Now, while the middle and little fingers are held in a flexed position, these accessory tendons, by virtue of their attached extremities, hold in check the extending power of the muscular fibres operating upon the tendon of the ring finger, and thus this finger is restricted in its function of extension to a very limited degree.

These accessory tendons are sometimes found in one hand and not in the other. They exist more frequently in the right hand than in the left. Now and then the extensor tendon of the ring



finger splits at the point of departure of the accessory slips and then reuniting leaves a button-hole appearance, and again these accessory slips are entirely absent.

In 1857, Mr. J. D., a young musician and a performer on the piano, consulted me in regard to his inability to *lift up*, as he expressed it, the ring finger of his right hand while the middle and little fingers neighboring were held flexed on the keys of his piano.

This restriction did not exist in the ring finger of his left hand; with it he had no trouble. I explained to him the presence of the accessory tendons in his right hand, with their restricting power, and told him of their probable absence in his left; they could be distinctly felt in his right hand, I could not observe them in the left.

At his desire I performed the operation of subcutaneous tenotomy on the tenth day of November of that year. An incision less than a quarter of an inch in length was made through the skin and fascia just below the carpal articulation of the metacarpal bone of the ring finger, and above the radial accessory slip of his right hand and parallel with, and on the radial aspect of, the extensor tendon of the ring finger.

A narrow blunt-pointed bistoury placed in this incision, with its handle depressed and its blade flatwise, was carried beneath the accessory slip and down as far as just a little above and between the knuckles of the ring and middle fingers, where its blunt point could be felt beneath the skin. The bistoury was now turned with its sharp edge towards the skin, and the middle finger strongly flexed and the ring finger extended, so as to make tense the accessory slip, when with a gentle sawing motion the slip was at once severed; the bistoury, turned flat-

1—2. The points at which the accessory tendons were cut.

wise, was now withdrawn through the same opening by which it entered. The accessory slip on the ulnar side of the extensor tendon of this ring finger was divided in a similar manner immediately afterwards by a distinct incision through the skin and fascia on the ulnar side of the extensor tendon of this finger. Not a quarter of a drachm of blood was lost in the two operations. A small piece of adhesive plaster was placed over each incision and a figure-of-8 bandage was carried around the wrist and hand, leaving the thumb free, and kept on for two days, when the patient was asked to perform on his piano in order to keep the cut extremities of the accessory tendons apart. A slight swelling of the parts existed for less than a week. The liberation of the ring finger was complete. The ball of the finger could be elevated an inch farther from the plane of the hand, and my patient expressed his gratification at the extended and great facility with which he could use this ring finger on the keys of his piano.



In 1881, Mr. Richard Zeckwer, the accomplished professor and director of music in the Philadelphia Musical Academy, called on me and asked me whether I could not cut these accessory tendons. He stated that if they could be cut in some of his students in music, that he was sure much time would be saved and their advancement in music greatly accelerated.

Mr. Zeckwer had been well taught the anatomy of the hand, in Leipsic, where he was educated in music, and was well aware already of the restraining force of these tendons. His views were right, in my opinion. He brought to me a young man whose left ring finger was very much restricted and the tense accessory tendons could be distinctly felt. At the young man's desire I operated at once and on dividing the tendons of the fingers he could lift this finger from the plane of the hand an inch higher than before the operation.

Since 1857 I have divided these accessory tendons for the purpose of liberating the ring finger in fourteen persons, and in nine of these the operation was performed on the tendons of both hands at one sitting. I do not think at any one of these operations half a drachm of blood was lost. In not one of them did any accident follow the operation. The issue in all of them was successful.

In two persons who came to my office together, strangers from a distance, I performed this operation on the two hands of each of them in the presence of my friend, Dr. Addinell Hewson, Jr. These two patients said, with emphasis, that there was not only relief in using the ring finger, but there was also an absence of exertion, which, before the operation, was constant and forcible along the back of the forearm and hand.

It will be observed that in this operation the totality, the complete sum of the power, of the extensor tendon going to the ring finger is left unimpaired. Nor does the operation lessen in the least the power of the common extensor muscle to extend the neighboring fingers.

The question may be asked, then, Of what use are these accessory tendons in man? As far as I am capable of observing, they are entirely vestigial. Just as we may believe that the plantares are vestigial muscles.

This brings us to look into the comparative anatomy of these accessory tendons, and to examine the entire muscular anatomy



of the hand. Prof. Owen thus writes, in regard to the flexor and extensor muscles in the hand of mammals: \* "The deep and superficial flexors of the fingers are distinct, but a remnant of that blending which exists in most lower mammals may be seen in the short connecting tendon which, in the aye-aye, passes from the ulnar belly of the 'flexor sublimis' to the division of the 'flexor profundus,' giving off the tendon to the middle fingers. The fleshy part of both flexors, but especially the deep one, is continued nearer to the hand in *Lemuridæ*, and most other *Quadrumana*, than in man, thus enabling the muscles to continue their action as finger-benders when the hand itself is flexed. . . . The 'flexor brevis,' the 'abductor,' the 'adductor' and 'opponens pollicis,' are present in the chimpanzee and gorilla, as are likewise the 'extensor longus' and 'extensor brevis.' In the orang these muscles begin to be confounded; in most lower *Quadrumana* they are blended together. The homologue of the 'extensor indicis' of man bifurcates, and sends a tendon both to the index and medius digit; the homologue of the 'extensor minimi digiti' likewise splits, and sends a tendon also to the annularis; so that, while in man the index and minimus only have two extensor tendons, all four fingers have them in most *Quadrumana*. The hand is thereby the stronger as a suspensor of the body from a bough."

In all felines we find that, although lateral motion in the hand is restricted, flexion and extension are very forcibly made. Thus in the cat we find not only a common extensor, but also a proper extensor to the index, middle, ring and little fingers. The proper extensors to the index and to the little fingers have their analogues in man in the extensor indicis and the extensor minimi digiti. In man the common extensor tendon of the ring finger gives off lateral branches; in the cat it does not, for here we find these accessory tendons perfect additional organs. We may believe then that the accessory tendons, going off from the extensor tendon of the ring finger in man, are the vestigial remains of muscles which in the lower animals are developed and perfect organs.

The perception of pleasure in the equality of sounds is the principle of music. If the power of producing the equality of sounds is restricted by these vestigial accessory tendons, they

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\* Owen, Comparative Anatomy and Physiology of Vertebrates, vol. III, p. 53.

should be divided, especially as this division is so easily accomplished.

I would divide them just as I would divide the tendon of the internal rectus in certain cases of squint, in order to extend the range of vision.

In examining the muscular anatomy of the hand, it will be found that flexion and extension are produced not only by those muscles which especially make these motions, but by all those muscles whose tendons pass beyond the radio-carpal articulation. Flexion of the wrist is produced by the radial and ulnar flexors of the carpus, and is aided by the flexors of the fingers, when the action of those muscles of the fingers is either completed or is opposed by any resistance, as when the over-extended hand is pressed against a surface in pushing, or in the support of the body. Extension of the wrist, in a similar manner, is accomplished not only by the three muscles specially devoted to that function—the extensor carpi radialis longior and brevior, and the extensor ulnaris—but also by the extensors of the fingers.

To ensure the efficient action of the long extensor and flexor muscles of the fingers it is necessary that there should be simultaneous action of the flexors and extensors of the wrist respectively; for the wrist-joint must be fixed backwards by its extensors, in order that the long flexors of the fingers may act. And the wrist must be fixed forwards by its flexors, in order that the long extensors may act upon the fingers.

The flexor communis digitorum sublimis and the flexor profundus bend respectively the second and the third phalanges of the fingers, while the extensor communis extends the *first row of phalanges*. The four lumbricales, on the other hand, and the seven interossei muscles have a double action, in consequence of their insertion into the lateral expansions of the extensor tendons, and some of the interossei directly into the base of the first phalanges. This action consists, first, in the flexion of the fingers at the metacarpo-phalangeal articulations, and, second, in extension of the second and third phalanges. The lumbricales and interossei,\* therefore, are antagonists to both the long flexors and to the long extensor. This partial and combined action of the long and short muscles upon the fingers has been well known for some

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\* Quain's Anatomy.



time, especially as regards the lumbricales; but it has recently been confirmed and elucidated, as regards the interossei, by the electro-physiological experiments and pathological observations of Duchene.\*

With respect to the interossei, it is further to be observed that, besides being *flexors* of the *first* phalanges, by virtue of their insertion into the base of these bones, and at the same time *extensors* of the *second* and *third* phalanges, by virtue of their further insertion into the lateral expansions of the extensor tendons, they severally exercise an abducting or adducting action on certain fingers, or direct them away from or towards the middle line of the hand, according to the places of their respective insertions; and thus the four dorsal interossei are also abductors of the index, middle and ring fingers, and the three palmar interossei are also adductors of the index, ring and little fingers respectively.

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\* Duchene, "Physiologie des Mouvements."







